Observations of the Meteoric Shower of 1866, *November* 13–14, *made at the Glasgow Observatory.* By Professor Grant.

The Meteoric Shower of November 13 was well seen here. Although the early part of the night was not favourable for observations, still a few shooting-stars were perceived as the sky from time to time became clear. These appearances occurred more frequently as the night advanced; but even about midnight the number of meteors seen was inconsiderable. Towards 13 hours G.M.T. the sky became clear in every direction, and fortunately continued so during the remainder of the night. Great numbers of beautiful meteors were now seen traversing every region of the heavens with a general movement directed from east to west. Multitudes of them were equal in brightness to stars of the first magnitude, many of them were equal to *Jupiter* when in opposition, while some of them even rivalled *Venus* when at her greatest brilliancy. Their prevailing colour was white, but some of them, especially the larger meteors, had an orange hue, while others again had a bluish tinge. They traversed the heavens with great apparent velocity. In many cases they described arcs of 50°, 60°, or 70°, although the interval of visibility did not in general exceed three seconds of time. In almost every instance the meteor, as it pursued its westward course, span out a beautiful train of light. The colour of this train was invariably a bright emerald green. In general the disappearance of the meteor preceded that of the train. While the meteor was visible, the train appeared to follow it straight as an arrow; but when the meteor vanished, by dissipating or bursting, the train was perceived to crumple up and rapidly melt away in the heavens. The observations were not long continued before it became evident that the meteors were directed from a definite region of the heavens situated in the constellation *Leo*, which was seen in the east, ascending above the horizon. This was indicated not only by the common direction of their westward motion, but also by the short dagger-like appearance of the trains which accompanied the meteors seen in the supposed region of emanation, contrasted with the almost invariably long trains of the meteors which passed the meridian during the short interval of visibility, a result obviously the effect of foreshortening.

At $13^h\,15^m$ G.M.T. I endeavoured to count the number of meteors visible in a minute, and found it to amount to fifty-seven. At $13^h\,20^m$ I counted forty-three in a minute. At $13^h\,25^m$ I counted thirty in the same interval of time. At $13^h\,30^m$ I counted forty-three in two minutes. At $14^h\,4^m$ the number visible in a minute had diminished to thirteen.

At $14^h\,41^m$ my attention was directed to an extraordinary blaze of light in the constellation *Ursa Major*. When first

seen it presented the appearance of a slightly curved broad band of light, indicative of the train of a meteor which itself had already disappeared, and which, judging from what was left behind, must have far exceeded in lustre any of the meteors seen during the night. The first apparition of this remarkable phenomenon I unfortunately lost, having been engaged at the time in writing down some details in my note-book. It was obvious, however, that the meteor had only just vanished, for the residuary mass of light was still very bright. I could only compare its appearance in this respect to that presented in a dark night by the blazing furnace of one of the great iron-works in the neighbourhood of Glasgow. In less than a minute after it was first seen, it assumed the appearance of a horse-shoe or inverted arch of diffused and rapidly diminishing light, one extremity of which was projected upon ε *Ursæ Majoris*, and the other upon γ and δ of the same constellation. Gradually it expanded in dimensions and grew fainter; at the same time the arch became more elongated and pointed, suggesting its resemblance to a merry-thought or the outline of a heart. At $14^h\ 48^m$ the western extremity was seen still to be attached to ε *Ursæ Majoris*, but the eastern had drifted from γ and δ to α and β of the same constellation, an effect doubtless attributable to the prevalence of a westerly wind which was blowing at the time. The apex was seen to descend as far as ψ *Ursæ Majoris*, or perhaps a little lower. This remarkable object continued to be distinctly visible till $14^h\ 56^m$; even at 15^h traces of it might still be discerned.

At 15^h the number of meteors visible amounted to only two in a minute. At $16^h\ 30^m$ only one meteor was visible every two or three minutes. At 17^h the starry hemisphere was found to have resumed its normal aspect.

I subjoin a statement of the observations made on the occasion of the apparition of this magnificent phenomenon. My chief object was to obtain as many facts as possible for establishing the position of the Radiant Point. Fortunately the great numbers of meteors which continued to illuminate the heavens for several hours supplied an abundant field of materials for effecting that object by noting the courses of the meteors so chosen relatively to the stars over or near which they passed. The meteor paths thus observed were laid down upon one of the star-maps of the British Association, kindly furnished to me for the purpose by Mr. A. S. Herschel. They indicate the radiant point to be situated in

	° ′
R.A.	147 35
Decl. N.	22 53

This point is situated very nearly in the intersection of two lines, one joining γ and ε *Leonis*, and the other η and μ of the same constellation.

I enclose also observations of the same phenomena made by Mr. John Plummer, one of the Assistants at the Observatory. These being similarly laid down upon one of the British Association star-maps, indicate the position of the radiant point to be—

	°	′
R. A.	150	30
Decl. N.	21	36

Mr. A. M'Gregor, the other Assistant at the Observatory, was placed under the direction of Mr. Herschel, who had selected the Observatory Hill as a convenient place for observing the phenomenon.

The Observatory,
Glasgow, Nov. 15, 1866.

Observations of the Meteors of November 13–14, 1866, *made at Glasgow Observatory by Mr. John Plummer, Assistant.*

Hour. h m s	Apparent Size.	Position.	Appearance, Train, if any, &c.	Length of Path.	Direction.
13 34 33	1st mag.	From a point 3° north of δ Orionis towards S.W. point of horizon	Bright streak		
13 36 34	2nd mag.	From a point 4° east of Mars towards S.S.W.	Short streak		
3 38 28	= Sirius	From a point 12° S.S.E. of α Orionis to 2° south of Rigel	Streak		
13 39 29	2nd mag.	From Aldebaran to *f* Tauri			
13 42 45	2nd mag.	From a point 4° south of η Tauri	...		Due west.
13 44 53	1st mag.	From ½ κ Orionis-Sirius towards S.W. point			
13 46 25	...	From β Can. Min. towards Rigel			
13 47 35	> Sirius	Seen through cloud in due west about 50° of altitude at commencement	...		Perpendicular.
13 53 5	= Sirius	From a point 3° north of Procyon towards θ Orionis	Fine streak, lasting 4 sec.		
13 54 56	1st mag.	From a point 3° south of Pollux towards Aldebaran			
13 56 58	...	From ½ Procyon-Rigel towards Rigel			
14 8 17	2nd mag.	From a point 3° south of ν Orionis towards S.W.	...	40°	